

**OXYGEN DOPING METHOD TO GALLIUM NITRIDE SINGLE  
CRYSTAL SUBSTRATE AND OXYGEN-DOPED N-TYPE GALLIUM  
NITRIDE FREESTANDING SINGLE CRYSTAL SUBSTRATE**

**ABSTRACT OF THE DISCLOSURE**

5        Oxygen can be doped into a gallium nitride crystal by preparing a non-  
C-plane gallium nitride seed crystal, supplying material gases including  
gallium, nitrogen and oxygen to the non-C-plane gallium nitride seed crystal,  
growing a non-C-plane gallium nitride crystal on the non-C-plane gallium  
nitride seed crystal and allowing oxygen to infiltrating via a non-C-plane  
10 surface to the growing gallium nitride crystal.

15        Otherwise, oxygen can be doped into a gallium nitride crystal by  
preparing a C-plane gallium nitride seed crystal or a three-rotationally  
symmetric plane foreign material seed crystal, supplying material gases  
including gallium, nitrogen and oxygen to the C-plane gallium nitride seed  
crystal or the three-rotationally symmetric foreign seed crystal, growing a  
faceted C-plane gallium nitride crystal having facets of non-C-planes on the  
seed crystal, maintaining the facets on the C-plane gallium nitride crystal and  
allowing oxygen to infiltrating via the non-C-plane facets to the gallium  
nitride crystal.

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